

ELGENCO NOISE GENERATORS

GENERAL PURPOSE SOLID STATE



602A

\$290

FREQ. RANGES: 20 cps to 20 kc, 20 cps to 500 kc, 20 cps to 5 mc.
OUTPUT SPECTRUM: 20 cps to 20 kc — ± 1 db, 20 cps to 500 kc — ± 3 db, 500 kc to 5 mc — ± 8 db.
OUTPUT LEVEL: (open circuit), 20 kc range — 3 volts, 500 kc range — 2 volts, 5 mc range — 1 volt.
OUTPUT IMPEDANCE: 900 ohms $\pm 10\%$
MAXIMUM LOAD: (on direct output) no limit
OUTPUT STEP ATTENUATOR: X1.0, X0.1, X0.01, and X.0001; calibrated to work into open circuit.
Accuracy: $\pm 3\%$ to 100kc, $\pm 10\%$ to 5 mc
Output Impedance: 200 ohms $\pm 1\%$
SPECTRAL DENSITY: Approximate spectral density (mv/ $\sqrt{\text{cps}}$) for 1 volt rms output. 20 kc band — 5, 500 kc band — 1.2, 5 mc band — 0.4.
AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical non-clipped Gaussian waveform all ranges.
OUTPUT METER: 0-5 volts rms.
OPERATING TEMP.: 0 to 50°C.
POWER: 115/230 volts $\pm 10/20$ volts, 50 to 1,000 cycles ac.
PANEL COLOR: Clear anodized brushed aluminum.
DIMENSIONS: 5 $\frac{1}{4}$ " high x 8 $\frac{3}{8}$ " wide x 11" deep.
SHIPPING WEIGHT: Approx. 10 lbs.



603A

\$495

FREQ. RANGES: 10 cps to 20 kc, 10 cps to 500 kc, 10 cps to 5 mc.
OUTPUT SPECTRUM: 20 cps to 20 kc, 20 cps to 500 kc, 500 kc to 5 mc, 10 cps to 500 kc — ± 1 db, 500 kc to 5 mc — ± 3.5 db.
OUTPUT LEVEL: (open circuit) 3 volts rms all ranges.
OUTPUT IMPEDANCE: 200 ohms $\pm 10\%$
MAX. LOAD: (on direct output) 700 ohms
OUTPUT STEP ATTENUATOR: X1.0, X0.1, X0.01, and X.0001; calibrated to work into open circuit.
Accuracy: $\pm 3\%$ to 500 kc, $\pm 5\%$ to 5 mc.
Output Impedance: 200 ohms $\pm 1\%$
SPECTRAL DENSITY: Approximate spectral density (mv/ $\sqrt{\text{cps}}$) for 1 volt rms output. 20 kc band — 5, 500 kc band — 1.2, 5 mc band — 0.4.
AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical non-clipped Gaussian waveform all ranges.
OUTPUT METER: 0-5 volts rms.
OPERATING TEMP.: 0 to 50°C.
POWER: 115/230 volts $\pm 10/20$ volts, 50 to 1,000 cycles ac.
PANEL COLOR: Clear anodized brushed aluminum.
DIMENSIONS: 5 $\frac{1}{4}$ " high x 8 $\frac{3}{8}$ " wide x 11" deep.
SHIPPING WEIGHT: Approx. 10 lbs.



610A

\$1175

FREQ. RANGES: 10 cps to 2 kc, 10 cps to 5 kc, 10 cps to 20 kc, 10 cps to 50 kc, 10 cps to 200 kc, 10 cps to 500 kc, 10 cps to 2 mc, and 10 cps to 5 mc.
OUTPUT SPECTRUM: Uniform ± 0.5 db from 10 cps to 500 kc and ± 2.0 db from 500 kc to 5 mc.
OUTPUT LEVEL: 0 to 1 volt rms, adjustable by front panel amplitude control. A dynamic range of 5 to 1 peak to rms value is provided.
OUTPUT STEP ATTENUATOR: X1.0, X0.1, X0.01, X0.001, X.0001. Accuracy $\pm .025$ db/step to 500 kc; ± 0.063 db/step to 5 mc.
SPECTRAL DENSITY: Approx. for 1 volt rms output.

Band	mv/ $\sqrt{\text{cps}}$	Band	mv/ $\sqrt{\text{cps}}$
2 kc	17.5	200 kc	1.75
5 kc	11.0	500 kc	1.10
20 kc	5.5	2 mc	0.55
50 kc	3.5	5 mc	0.30

AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical Gaussian all ranges.
OUTPUT METER: 0 to 1 volt rms. Accuracy $\pm 2\%$ of full scale to 2 mc; $\pm 5\%$ to 5 mc.
MAXIMUM LOAD: 500 ohms on direct output.
OUTPUT IMPEDANCE: 50 ohms direct output.
POWER REQUIREMENTS: 115/230 volts $\pm 10/20$ volts, 50 to 1,000 cycles ac.
PANEL COLOR: Clear anodized brushed aluminum.
DIMENSIONS: 5 $\frac{1}{4}$ " high x 8 $\frac{3}{8}$ " wide x 11" deep.
SHIPPING WEIGHT: Approximately 11 lbs.



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LOW FREQUENCY TUBE TYPE ELGENCO NOISE GENERATORS



301A \$1995

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian $\pm 1\%$.
OUTPUT SPECTRUM: Uniform ± 0.1 db from 0 to 35 cps.
MAX. OUTPUT: 12 volts rms into a 1 megohm input resistance.
 Dynamic range of 5 to 1 peak-to-rms is provided.
MAX. SPECTRAL DENSITY: Approx. 2.5 volts²/cps.
D.C. UNBALANCE: Less than 50 mv.
POWER: 115 v ± 10 v, 60 cps ac.
MOUNTING: Standard relay rack panel 7" high x 19" wide.
COLOR: Rack panel in flat grey.
SHIPPING WEIGHT: Approx. 40 lbs.

321A \$2095

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian $\pm 1\%$.
OUTPUT SPECTRUM: Uniform ± 0.1 db from 0 to 105 cps.
MAX. OUTPUT: 12 volts rms into a 1 megohm input resistance.
 Dynamic range of 5 to 1 peak-to-rms is provided.
MAX. SPECTRAL DENSITY: Approx. 1.0 volts²/cps.
D.C. UNBALANCE: Less than 50 mv.
POWER: 115 v ± 10 v, 60 cycles ac.
MOUNTING: Standard relay rack panel 7" high x 19" wide.
COLOR: Rack panel in flat grey.
SHIPPING WEIGHT: 40 lbs.

GENERAL PURPOSE TUBE TYPE ELGENCO NOISE GENERATORS



331A \$1295

OUTPUT SPECTRUM: Uniform to plus or minus 0.5 db from 10 to 20,000 cps.
OUTPUT LEVEL: 0 to 5 volts rms, adjustable by self contained attenuator. A dynamic range of 7 to 1 peak to rms value is provided.
SPECTRAL DENSITY: Approx. 1 mv²/cps for 5 volt rms output.
AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian $\pm 1\%$.
NOISE REGULATOR: rms output level continuously stabilized against a zener reference voltage. Output regulation $\pm 0.1\%$ for input range of 2 to 1. Regulation range is greater than 4 to 1.
OVERLOAD INDICATOR: Panel overload indicator lights when input noise level to regulator is out of regulation range.
OUTPUT METER: 0 to 5 volts rms.
MAX. LOAD: 10,000 ohms.
OUTPUT IMPEDANCE: Less than 10 ohms.
POWER REQUIREMENTS: 115/230 volts $\pm 10/20$ volts. 50 to 1,000 cycles AC.
COLOR: Rack panel is flat grey.
MOUNTING: Standard relay rack panel 7" high x 19" wide and is 15" deep. Can be supplied in deluxe metal cabinet.
SHIPPING WEIGHT: Approx. 50 lbs.

331A-23	10 cps to 2 kc	\$1395
331A-53	10 cps to 5 kc	\$1395
331A-54	10 cps to 50 kc	\$1395
331A-25	10 cps to 200 kc	\$1495
331A-55	10 cps to 500 kc	\$1645

DUAL OUTPUT TUBE TYPE ELGENCO NOISE GENERATORS



Amp. Probability Dist.
 Output Spectrum
 Max. Output
 Max. Spectral Density
 DC Unbalance
 Output Load
 Power
 Mounting
 Color
 Shipping Weight

311A
 Gaussian $\pm 1\%$
 Uniform $\pm .1$ db 0 to 35 cps
 12 volts rms
 2.5 (volts)²/cps approx.
 Less than 50 mv
 1 megohm minimum
 115v ± 10 v, 50/60 cps at 90 watts
 Standard relay rack 7" high x
 19" long or deluxe cabinet
 Rack panel is flat grey
 Approximately 45 lbs.

\$2395

312A
 Gaussian $\pm 2\%$
 Uniform $\pm .5$ db, 10 cps to 20 kc
 15 volts rms
 7.5 (mv)²/cps approx.
 100k ohms minimum

\$2495

Gaussian $\pm 1\%$
 Uniform ± 0.1 db 0 to 105 cps
 12 volts rms
 1.0 (volts)²/cps approx.
 Less than 50 mv
 1 megohm minimum

Phone, wire, write your local Elgenco Rep for fast service



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MODEL 311A

GAUSSIAN NOISE GENERATOR

In the analysis and synthesis of complex guidance, control and communication systems it is often necessary to determine the effects of noise signals on system performance. The complexity of modern systems and the nature of their stringent performance requirements necessitate that more and more consideration be given to system operation in response to statistical inputs.

Many performance inaccuracies are essentially random functions of time and they cannot be prescribed a priori except in a general statistical sense. For example, the position of a target indicated by a radar set contains components of noise which vary with time in an unpredictable way; also, as a result of manufacturing tolerances in a system, the sensitivities and other fixed parameters of operating components are subject to variations, either in the form of slight fluctuations with time or in the form of variations from one system to another; also, an automatic control system is seldom designed to perform a single task which may be completely specified beforehand but it is designed to perform a task selected at random from a complete repertory of possible tasks. In general, every phenomena which is not amenable to exact a priori specification becomes the proper subject for study by the methods of statistical reasoning.

The Model 311A Noise Generator was designed to fill the need for a precise general purpose instrument which can accurately simulate various random quantities under study. It supplies two gaussian noise voltages with precisely controlled "white" power frequency spectra; one output has a spectral characteristic covering the range from 10 to 20,000 cps (or higher) and the other output covers the range from 0 to 40 cps. These characteristics make the Model 311A especially useful when used in conjunction with analog computers with a repetitive or iterative mode.

The basic noise source of the Model 311A is a gas tube in a transverse magnetic field. The magnetic field eliminates plasma oscillations which are generated by a gas discharge and thereby helps to insure the randomness of the amplitude distribution and the uniformity of the power spectrum. The output from the gas tube is fed into a shaping amplifier which equalizes the noise tube characteristics. The noise is then passed through a precision regulator circuit which continuously stabilizes its output against a zener reference voltage. The resulting noise voltage is passed through an attenuator and amplifier whose output has a constant noise spectrum from 10 to 20,000 cps.

The output from the regulator is also filtered by a precision network resulting in a band of noise centered about a frequency f_0 . After amplification by a variable gain feedback amplifier, the noise is phase-detected by a solid state chopper operating at f_0 cps. A low-pass filter removes the high frequency components arising from the detection process. The result is a low frequency noise voltage whose spectral density is constant from 0 to 40 cps.

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SPECIFICATIONS

LOW FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION:

Gaussian (Normal) to plus or minus one percent.

OUTPUT SPECTRUM:

Uniform (constant) to plus or minus 0.1 db from 0 to 35 cps. Output falls off rapidly above 40 cps.

MAXIMUM OUTPUT LEVEL:

12 volts RMS into a 1 megohm input resistance. A dynamic range of 5 to 1 peak-to-RMS value is provided.

MAXIMUM SPECTRAL DENSITY:

Approximately 2.5 (volts)^2 per cps.

D. C. UNBALANCE:

Less than 50 millivolts, with 95% certainty.

HIGH FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION:

Gaussian (Normal) to plus or minus two percent with zero mean.

OUTPUT SPECTRUM:

Uniform to plus or minus 0.5 db from 10 to 20,000 cps (can also be supplied with uniformity up to 50,000 cps).

MAXIMUM OUTPUT LEVEL:

15 volts RMS.

MAXIMUM SPECTRAL DENSITY:

Approximately $7.5 \times 10^{-3} \text{ (volts)}^2$ per cps.

OUTPUT LOAD:

Minimum 100,000 ohms.

POWER SUPPLY

Built-in highly regulated plate and filament voltage supplies.

POWER REQUIREMENTS

115v plus or minus 10v, 50/60 cycles AC at 90 watts.

COLOR

Rack panel is flat grey.

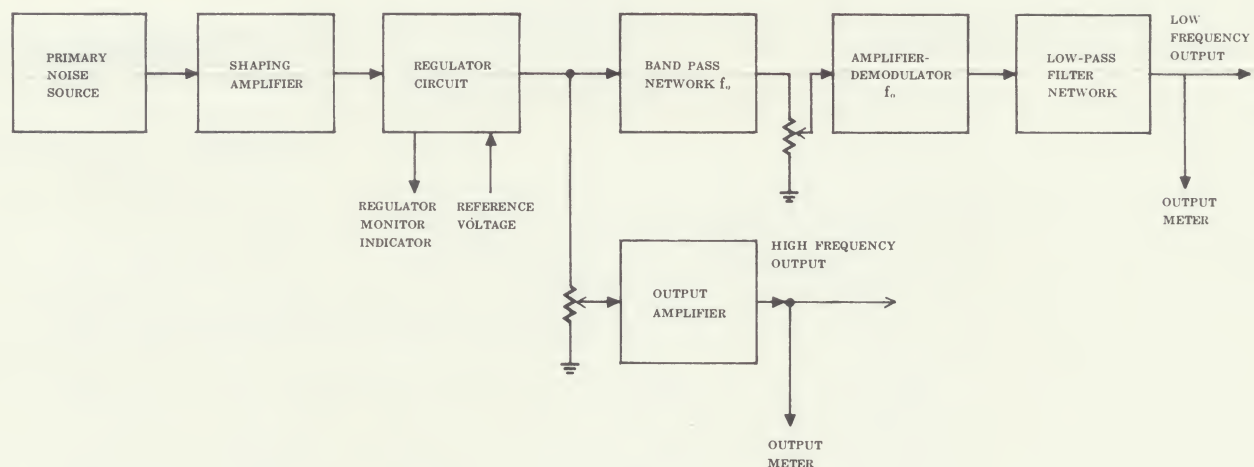
MOUNTING

Mounted on standard relay rack panel 7" high x 19" wide; Model 311A is 15" deep. Can be supplied in deluxe cabinet.

SHIPPING WEIGHT

Approximately 45 lbs.

BLOCK DIAGRAM OF MODEL 311A GAUSSIAN NOISE GENERATOR



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NOISE GENERATOR PRICE LIST

May 1, 1965

General Purpose Solid State Noise Generator

Model 602A 20 cps to 5 mc (cabinet)	\$290.00
Model 603A 20 cps to 5 mc (cabinet)	\$495.00
Model 610A 10 cps to 5 mc (cabinet)	\$1,175.00

Options Available For the Above Solid State Instruments

1. Rechargeable battery	Add	\$135.00
2. Full rack width cabinet and rack mounting hardware	Add	\$30.00

Accessories Available For the Above Solid State Instruments

1. Adaptor kit - Dual unit and rack mounting hardware	\$7.00
2. Adaptor kit - Single unit rack mounting	\$56.00
3. Rechargeable battery kit	\$145.00

General Purpose Tube Type Noise Generators

Model 331A 10 cps to 20 kc (rack mounted)	\$1,295.00
Model 331A-23 10 cps to 2 kc (rack mounted)	\$1,395.00
Model 331A-53 10 cps to 5 kc (rack mounted)	\$1,395.00
Model 331A-54 10 cps to 50 kc (rack mounted)	\$1,395.00
Model 331A-25 10 cps to 200 kc (rack mounted)	\$1,495.00
Model 331A-55 10 cps to 500 kc (rack mounted)	\$1,645.00

Low Frequency Tube Type Noise Generators

Model 301A DC to 40 cps (rack mounted)	\$1,995.00
Model 311A Dual Output DC to 40 cps, 10 cps to 20 kc (rack mounted)	\$2,395.00
Model 312A Dual Output DC to 120 cps, 10 cps to 20 kc (rack mounted)	\$2,495.00
Model 321A DC to 120 cps (rack mounted)	\$2,095.00

Deluxe cabinet for tube type Noise Generators	Add	\$48.00
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PRICES

All prices are net with no discounts. Prices are FOB our plant and are exclusive of all taxes now in effect or that may be imposed hereafter by federal, state, or local governments. Prices given are subject to change without notice. Formal price quotations remain in effect for 30 days in the United States and Canada, 60 days in other areas.

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A surcharge of 1 per cent (\$2.50 minimum) applies on all orders requiring inspection at our plant either by one of the government services or by the customer's own inspection department or other private agency. The inspection surcharge applies on each shipment inspected.

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For customers in the United States and Canada, terms are net 30 days if credit has been arranged; otherwise, unless payment is received before shipment, shipment will be made COD. For customers outside the United States and Canada, terms are confirmed irrevocable letter of credit or cash in advance.

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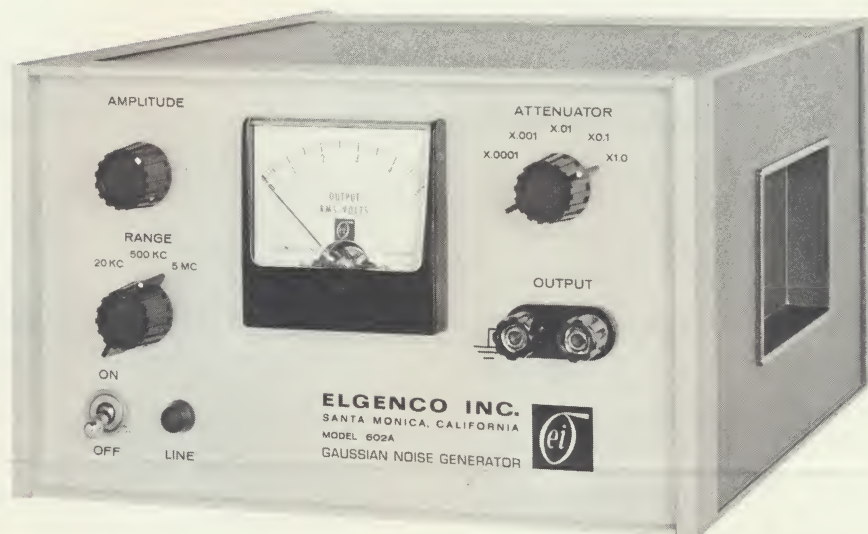
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TENTATIVE DATA

MODELS 602A/603A

ALL SOLID STATE NOISE GENERATORS

Many systems, test stations, test sets, laboratory benches, and other areas, require sources of symmetrical, non-clipped Gaussian noise for many diverse applications including audio testing, vibration analysis, and general purpose testing. The Models 602A/603A were developed as companion units to the Model 610A for use in those areas not requiring the precise specifications or operating flexibility of this more expensive unit.

These new all solid state instruments incorporate the flexible modular package proven in the Model 610A. Upgrading of existing systems and test stations utilizing noise generators is easily accomplished with either of these models by using one of the various mounting options available.

The Model 602A/603A Noise Generators employ a solid state device as a noise source. The output of the noise source is amplified by a special low noise feedback preamplifier. The noise is then passed through a switchable single pole low pass RC filter. The resulting signal is then further amplified by a variable gain feedback amplifier. The appropriate gain for each frequency range is selected by the range switch. The resulting noise voltage is then passed through another switchable single pole low pass RC filter and through the variable attenuator to the output amplifier. The output of this amplifier is fed to the output meter and the five position output attenuator. The output of the attenuator is brought to the front panel. The output meter is an average reading voltmeter calibrated to read the RMS value of a Gaussian distributed voltage. The required dc power is supplied by a regulated power supply that uses a zener reference diode.

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SPECIFICATIONS

FREQUENCY RANGES:	602A	603A
	20 cps to 20 kc	10 cps to 20 kc
	20 cps to 500 kc	10 cps to 500 kc
	20 cps to 5 mc	10 cps to 5 mc

OUTPUT SPECTRUM:

20 cps to 20 kc	±1 db	
20 cps to 500 kc	±3 db	
500 kc to 5 mc	±8 db	
10 cps to 500 kc		±1 db
500 kc to 5 mc		±3.5 db

OUTPUT LEVEL: (Minimum value of maximum open circuit output)

200 kc range	3 volts	3 volts
500 kc range	2 volts	3 volts
5 mc range	1 volt	3 volts

OUTPUT IMPEDANCE:

900 ohms ±10%	200 ohms ±10%
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MAXIMUM LOAD: (on direct output)

no limit	700 ohms
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OUTPUT STEP ATTENUATOR: Five positions: X1.0, X0.1, X.01, X.001, and X.0001; calibrated to work into open circuit.

Accuracy	±3% to 100 kc	±3% to 500 kc
	±10% to 5 mc	±5% to 5 mc
Output Impedance	200 ohms ±1%	200 ohms ±1%

SPECTRAL DENSITY: Approximate spectral density (mv $\sqrt{\text{cps}}$) for 1 volt RMS output.

20 kc band	5	5
500 kc band	1.2	1.2
5 mc band	0.4	0.4

AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical non-clipped Gaussian waveform all ranges.

OUTPUT METER: Rectifier type meter circuit reads proportional to average value, calibrated to read RMS value of Gaussian Noise; 0-5 volts RMS scale.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER SUPPLY: Built-in highly regulated dc supply.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 cycles ac; approximately 5 watts. A rechargeable battery option is available. Battery is recharged by operating unit on ac line.

PANEL COLOR: Panel is clear anodized brushed aluminum.

DIMENSIONS: 5-1/4" high x 8-5/8" wide x 11" deep.

RACK MOUNT: A rack mounting adapter kit is available for rack mounting two units side by side. Also available is a rack mounting adapter kit for rack mounting one unit. One or two units use 5-1/4" x 19" of rack panel space with adapter kit. Full rack width cabinet option for one unit is available. Size of unit with this option is 5-1/4" high by 17" wide x 11" deep and comes with rack mounting hardware.

SHIPPING WEIGHT: Approximately 10 lbs.

ACCESSORIES: Dual unit adapter kit and rack mounting hardware, \$7.00; single unit adapter kit with rack mounting hardware and front and rear dummy panels, \$56.00; Rechargeable battery adapter kit, \$145.00.

PRICE: 602A, \$290.00; 603A, \$495.00; Full rack width option add \$30.00; rechargeable battery option add \$135.00.



Model 602A with full rack width mounting option.



Models 602A and 610A combined by dual unit adapter kit.



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May 1, 1965

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Model 602A 20 cps to 5 mc (cabinet)	\$290.00
Model 603A 20 cps to 5 mc (cabinet)	\$495.00
Model 610A 10 cps to 5 mc (cabinet)	\$1,175.00

Options Available For the Above Solid State Instruments

1. Rechargeable battery	Add	\$135.00
2. Full rack width cabinet and rack mounting hardware	Add	\$30.00

Accessories Available For the Above Solid State Instruments

1. Adaptor kit - Dual unit and rack mounting hardware	\$7.00
2. Adaptor kit - Single unit rack mounting	\$56.00
3. Rechargeable battery kit	\$145.00

General Purpose Tube Type Noise Generators

Model 331A 10 cps to 20 kc (rack mounted)	\$1,295.00
Model 331A-23 10 cps to 2 kc (rack mounted)	\$1,395.00
Model 331A-53 10 cps to 5 kc (rack mounted)	\$1,395.00
Model 331A-54 10 cps to 50 kc (rack mounted)	\$1,395.00
Model 331A-25 10 cps to 200 kc (rack mounted)	\$1,495.00
Model 331A-55 10 cps to 500 kc (rack mounted)	\$1,645.00

Low Frequency Tube Type Noise Generators

Model 301A DC to 40 cps (rack mounted)	\$1,995.00
Model 311A Dual Output DC to 40 cps, 10 cps to 20 kc (rack mounted)	\$2,395.00
Model 312A Dual Output DC to 120 cps, 10 cps to 20 kc (rack mounted)	\$2,495.00
Model 321A DC to 120 cps (rack mounted)	\$2,095.00

Deluxe cabinet for tube type Noise Generators	Add	\$48.00
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